COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

HEARING CHARTER

H.R. ____, Green Chemistry Research and Development Act of 2004

Wednesday, March 17, 2004
10:00 a.m.-12:00 p.m.
2318 Rayburn House Office Building

1. Purpose

On Wednesday, March 17, 2004 the House Science Committee will hold a hearing to examine Federal and industry green chemistry research and development (R&D) activities, and to receive testimony on *H.R.* ____, the *Green Chemistry Research and Development Act of 2004*. This bill would authorize a Federal green chemistry R&D program.

2. Witnesses

Dr. Arden Bement is the Acting Director of the National Science Foundation (NSF) while continuing in his position as the Director of the National Institute of Standards and Technology (NIST).

Dr. Paul Gilman is the Assistant Administrator for Research and Development at the Environmental Protection Agency (EPA). He also serves as the Agency's Science Advisor.

Dr. Berkeley Cue is Vice President of Pharmaceutical Sciences at Pfizer Global Research and Development. Pfizer, Inc. has established green chemistry teams at its facilities throughout the world, and won a 2002 Presidential Green Chemistry Challenge Award for the redesign of the sertraline manufacture process. Sertraline is the active ingredient in Zoloft, which is used widely in the U.S. to treat depression. The new process improves worker and environmental safety, reduces energy and water use, and doubles overall product yield.

Mr. Steven Bradfield is Vice President of Environment Development at Shaw Industries. Shaw Industries won a 2003 Presidential Green Chemistry Challenge Award for the development of EcoWorx™ carpet tile. EcoWorx™ carpet tiles are made from low toxicity feedstocks and are recyclable.

Dr. Edward Woodhouse is Associate Professor of Political Science in the Department of Science & Technology Studies at Rensselaer Polytechnic Institute. Dr. Woodhouse studies the social aspects of technological decision-making.

3. Overarching Questions

- How has – and how can – effective application of green chemistry products and processes contributed to environmental protection and sustainability? What are the costs associated with using green chemistry products and processes?

- How has private industry benefited from, and contributed to, green chemistry breakthroughs? To what extent has private industry used green chemistry products and processes? What are the primary barriers to increased development and adoption of green chemistry products and processes, and how can these barriers be removed?

- What is the current status of the Federal government's efforts in green chemistry R&D? Are expanded Federal efforts and increased Federal coordination in green chemistry warranted?

- Does H.R. ____ establish a program that will result in greater R&D breakthroughs and increased adoption of green chemistry? How can the legislation be improved?

4. Brief Overview

- Green chemistry is the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances. Green chemistry is a form of pollution prevention – preventing pollution rather than treating emissions.

- A number of success stories have generated a great deal of excitement about the significant potential of green chemistry for environmental and economic benefit. Implementation of green chemistry at a Dow Chemical plant aimed at increasing efficiency and instituting more recycling is showing a 174 percent annual return on a one-time investment. However, even this highly touted example has not been repeated and adoption of green chemistry products and processes by industry has been limited. Barriers to greater adoption include a workforce unfamiliar with green chemistry, a lack of existing and demonstrated alternatives, the sometimes high capital costs of changing processes, a lack of regulatory drivers, and inertia.

- Federal support for green chemistry R&D has also been limited. The most notable effort is the joint-NSF/EPA Technology for a Sustainable Environment (TSE) program. The program, which includes, but is not limited to, green chemistry activities, awarded $11 million in R&D grants in fiscal years 2002-03. Other agencies such as the Department of Energy (DOE) and NIST also provide support for green chemistry.

- EPA also administers the Presidential Green Chemistry Challenge Awards Program to recognize advances in and to promote green chemistry. Since 1996, this program has made 40 awards to businesses and academics that develop technologies that incorporate the principles of green chemistry and that have or can be used by industry. Both Pfizer, Inc. and Shaw Industries have recently won this award.

- On March 16, 2004 Representative Phil Gingrey introduced *H.R.* ____, the *Green Chemistry Research and Development Act of 2004*. This legislation would establish an Interagency Working Group to coordinate Federal green chemistry R&D activities and facilitate adoption of green chemistry by the private sector. The bill would authorize funding for these activities (from within existing authorizations) at NSF, EPA, NIST, and DOE through fiscal year 2007.

5. Background

What is green chemistry?

Green chemistry is most commonly defined as chemistry and chemical engineering that involves the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances. It is sometimes characterized as "benign by design" to emphasize that it is green intentionally. Also known as sustainable chemistry, benign chemistry, or source reduction, green chemistry seeks to prevent the creation of hazards, instead of focusing on limiting the spread of pollutants or cleaning up waste. Its practices are encapsulated in twelve generally accepted guiding principles (Appendix I) that can be used by chemists to develop processes and assess how green a process is.

Examples of green chemistry include the development of pesticide alternatives that are effective at killing target organisms, but are benign to non-target organisms and do not persist in the environment. Another example is the use of the benign solvent supercritical carbon dioxide in dry cleaning processes instead of toxic perchloroethylene.

Pfizer and Shaw Industries provide good examples of the potential of green chemistry. Pfizer won a 2002 Presidential Green Chemistry Challenge Award for the redesign of the sertraline manufacture process. Sertraline is the active ingredient in Zoloft, which is used widely in the U.S. to treat depression. By applying green chemistry principles, Pfizer was able to eliminate 140 metric tons per year of titanium tetrachloride, 100 metric tons per year of sodium hydroxide, 150 metric tons per year of hydrochloric acid, and 440 metric tons per year of solid titanium oxide. These changes improve worker and environmental safety, reduce energy and water use, and double overall product yield. Shaw Industries won a 2003 Presidential Green Chemistry Challenge Award for the development of EcoWorx™ carpet tile. Historically, carpet tile backings have been manufactured using polyvinyl chloride (PVC). PVC is made from toxic feedstocks and its combustion results in toxic byproducts such as dioxin and hydrochloric acid. EcoWorx™ carpet tiles are made from low toxicity feedstocks and are recyclable.

What are the benefits of green chemistry?

Besides the inherent advantages to human health and the environment, green chemistry can offer economic advantages and improvements to worker safety, public safety, and national security.

Many in the private sector have recognized the potential savings that green chemistry offers. For example, by using benign chemical processes, businesses can avoid the costs associated with treating or cleaning up pollutants. Other savings can come from simply making more efficient use of raw materials (sometimes referred to as "atom economy") and energy. Dow Chemical Company's Midland, Michigan facility is an example of the level of savings a company can achieve. In 1996 Dow partnered with the Natural Resources Defense Council to conduct a thorough review of the facilitiy's processes to identify ways to implement more recycling and substitute benign materials for hazardous ones. By April 1999, after a one-time investment of $3.1 million, the facility had reduced emissions of targeted substances by 43 percent and the amount of targeted wastes by 37 percent primarily through green chemistry innovations. The improvements are saving Dow $5.4 million per year, a 174 percent annual return on investment.[1] However, even though these benefits are clear, this process has not been repeated widely by industry and not even by Dow itself. There are many barriers to adoption of green chemistry that are discussed later. In this case, one barrier was that even though the return on investment was good, Dow had other investment opportunities that offered even greater returns.

Many other inherent advantages come from green chemistry in the areas of worker safety, public safety, and national security. For example, many chemical processes are conducted at extreme temperature and/or pressure, two conditions that present a potential hazard for workers. Also, many processes involve toxic substances. Green chemistry seeks to design processes that can be conducted at or near room temperature and pressure, and that use benign substances. Both of these steps can improve working conditions for employees, and reduce the costs of liability protections for employers.

Chemical factories also pose a potential threat to public safety because of the possibility of an accidental release of toxic materials into the surrounding communities. Green chemistry seeks to replace these toxic substances with benign ones, which would not pose a threat to the public if accidentally released. Reducing the number of toxic chemical plants and the transport of toxic chemicals also improves national security by reducing the number of potential terrorist targets.

What barriers exist to greater adoption of green chemistry?

Despite the numerous potential advantages of green chemistry for the chemical manufacturing industry, adoption of green chemistry technologies has been limited. Significant impediments exist that discourage businesses from pursuing such alternatives. These include:

- **A workforce unfamiliar with green chemistry –** The existing chemical manufacturing workforce is mainly composed of chemists and chemical engineers that have little or no training in green chemistry techniques. Even today, most graduate chemistry curricula give little attention to green chemistry. Without appropriate personnel trained in green chemistry, a company may not know, or be able, to search for and implement green chemistry alternatives to their chemical processes.

- **Lack of existing green chemistry alternatives –** Green chemistry alternatives have not yet been designed for most of the chemical processes in use today. Developing a green

[1] Amato, Ivan, *Fortune*, New York: July 24, 2000, vol. 142, issue 3, pg. 270U

chemistry alternative might be prohibitively expensive and time consuming, especially for companies that do not have extensive R&D programs and when time to market is critical.

- **Lack of demonstrated green chemistry alternatives –** Even for the green chemistry alternatives that do exist, many of them have not been proven in an industrial setting. Few companies are willing to take the risk of being the first to implement a new and unproven technology.

- **Costs of up-front capital investment –** U.S. companies have invested heavily in existing infrastructure. Switching to green chemistry processes might require this infrastructure to be extensively retooled, which could make adopting green chemistry technologies initially very expensive. Even though the process may be economical when costs are computed over the full life cycle, many companies may be unwilling to pay the high up-front costs. This is one reason why there is more green chemistry adoption in manufacturing sectors that turn over their processes more frequently.

- **Lack of regulatory drivers –** Few governmental incentives exist for adoption of green chemistry. Most environmental regulations sanction polluters, while few reward pollution prevention. The government could make adoption of green chemistry more attractive by extending the patent life of green products or accelerating the approval of products that pose minimal hazard.

- **Inertia –** Perhaps the most important impediment to adopting green chemistry technologies is inertia within industry. For a company that already complies with all existing environmental regulations, there is little impetus to seek out and implement alternative processes. Additionally, few companies offer incentives to employees that improve environmental performance. This lack of motivation often means that only those companies that have made environmental sustainability a priority use green chemistry processes.

H.R. **____** is designed to overcome some of these impediments. The bill would support undergraduate and graduate education in green chemistry. This should help create a new generation of chemists and engineers who are familiar with green chemistry and its advantages, and can bring those skills to bear in the workplace.

The coordinated R&D program would support R&D and demonstration projects at universities, industry and Federal labs, and make the results of these activities readily available through a green chemistry database of accomplishments and best practices. This R&D would develop and demonstrate more green chemistry alternatives that will be available for implementation by industry.

What is the Federal government currently doing?

The Federal government supports activities related to green chemistry through agencies including NSF, EPA, DOE and NIST. In some cases, as with EPA, these activities are focused directly on green chemistry. In other cases, such as with DOE, these activities are byproducts of efforts to achieve other goals, such as improving energy efficiency. Because some green chemistry investments are direct and some are indirect, and because green chemistry is not broken out in agency budgets, it is difficult to determine the exact Federal investment in green chemistry.

However, it is clear that the investment in green chemistry and chemical engineering is small as compared to the investment in chemistry and chemical engineering as a whole. In 2000, the four agencies mentioned above spent approximately $540 million on chemistry and chemical engineering R&D; investment in green chemistry R&D was probably close to $40 million. In addition, green chemistry activities are not coordinated among the agencies.

Following is a table that indicates, in general, agency budgets for green chemistry and chemical engineering activities. The table is followed by descriptions of how this money is spent.

	EPA	NSF	NIST	DOE
FY04 funding	$7 million	$29 million	$4 million	Does not track
FY05 proposal	$5 million	No change	No change	Does not track
Total Chemistry and Chemical Engineering (2000)	$23 million	$186 million	$39 million	$292 million

EPA conducts two general types of activities in green chemistry. EPA conducts and supports R&D through the Office of Research and Development; and EPA conducts outreach and promotion through the Office of Pollution Prevention and Toxic Substances (OPPTS).

In FY04, EPA will spend approximately $5 million on direct green chemistry and chemical engineering R&D. The money comes out of a larger spending category, called Pollution Prevention. Approximately half of this money is spent on internal R&D, conducted at EPA's lab in Cincinnati. The lab focuses on developing cross-cutting tools for industry such as benign solvent design software. The other half of this money funds external R&D, through the Science to Achieve Results (STAR) program. As part of this program, EPA and NSF have developed a partnership, the Technologies for a Sustainable Environment (TSE) program, which primarily funds green chemistry and chemical engineering R&D.

The TSE program is the external R&D program most focused on green chemistry in the Federal government. The partnership between EPA and NSF has been hailed as a model of cooperation. EPA and NSF put out a joint request for proposals, and then award grants based on their own mission. NSF funds more basic green chemistry R&D, while EPA funds more applied R&D aimed at mission oriented problems. TSE was initiated in 1995 and has awarded 204 grants totaling just over $56 million since then. In the FY05 budget, the Administration has proposed to cut EPA's funding for this program entirely.

EPA conducts outreach and promotes green chemistry (funded at approximately $2 million in FY04) through OPPTS. OPPTS administers the Presidential Green Chemistry Challenge Award Program. This award, first awarded in 1996 and given annually, recognizes achievements in green chemistry. Appendix II includes a number of examples of green chemistry achievements that have been recognized by this program. In FY05, the Administration proposes to increase funding for pollution prevention in OPPTS by $5 million. A portion of this funding will be used for green chemistry activities, including expanding the focus of the awards program to address existing and emerging chemical priorities.

Outside of the TSE collaboration with EPA, NSF does not put out specific solicitations for green chemistry R&D, but funds a wide range of investigator-driven green chemistry R&D. While NSF does not have a specific line item in the budget for green chemistry activities, NSF estimates that in FY04 it will spend approximately $10.8 million on green chemistry activities in the chemistry division and $13 million on green chemistry activities in the chemical transport systems division. However, it is difficult to determine the exact level of investment because much of this funding may be used for "multi purpose" fundamental research that has implications for green chemistry and other research areas. It is not the intent of the Green Chemistry Research and Development Act to decrease NSF's investment in green chemistry R&D; instead the bill seeks to focus more NSF funding specifically on R&D that is intended to advance green chemistry.

DOE does not track spending on green chemistry activities, and does not conduct activities that it specifically identifies as green chemistry. However, DOE conducts R&D that has many green chemistry applications. DOE's fundamental research efforts in chemistry are focused on attaining an atomic and molecular level understanding of processes involved in the generation, storage, and use of energy.

NIST has R&D programs that are yielding green chemistry results. NIST's mission is to develop and promote measurements, standards, and technology to enhance productivity and improve the quality of life. Much of the R&D conducted within this mission has green chemistry applications. For example, the Chemical Science and Technology Laboratory produces more accurate measurement methods and standards to enable the development and implementation of green technologies and assess its impact.

While the agencies above conduct a number of green chemistry-related R&D, these efforts are small when compared to their overall R&D, and even the chemistry and chemical engineering R&D budgets for these agencies. In addition, the efforts are not coordinated and are not strategic in nature.

6. Summary of H.R. ____

The Green Chemistry Research and Development Act would authorize an interagency green chemistry R&D program. NSF and EPA would lead an Interagency Working Group to coordinate Federal green chemistry activities. The Working Group would also include DOE and NIST, as well as any other agency the President designates. The program would be authorized at $26 million in FY05 rising to $30 million in FY07 (from within existing authorizations). See Appendix III for a break down of funding by agency.

The Program would support R&D grants, including grants for university-industry partnerships, support green chemistry R&D at Federal labs, promote education through curricula development and fellowships, and collect and disseminate information about green chemistry. A complete section-by-section analysis of the legislation is provided in Appendix III.

7. Questions for the Witnesses

Questions for Dr. Bement

- Please describe the National Science Foundation's (NSF's) current activities in green chemistry. How much does NSF spend on green chemistry research? Through which NSF programs? How much emphasis is placed on basic research versus applied research and development?
- To what extent does NSF coordinate and collaborate with other Federal agencies in green chemistry research and development?
- What are NSF's views on *H.R.* ____, the *Green Chemistry Research and Development Act of 2004*? How could the bill be improved?

Questions for Dr. Gilman

- Please describe the Environmental Protection Agency's (EPA's) current activities in green chemistry. How much does EPA spend on green chemistry research? How much of this research is conducted intramurally versus extramurally? How much emphasis is placed on basic research versus applied research and development?
- To what extent does EPA coordinate and collaborate with other Federal agencies in green chemistry research and development?
- What are EPA's views on *H.R.* ____, the *Green Chemistry Research and Development Act of 2004*? How could the bill be improved?

Questions for Dr. Cue

- Please describe Pfizer, Inc.'s green chemistry activities. Have past investments in green chemistry paid off for Pfizer, Inc.? What environmental and human health benefits have resulted from Pfizer, Inc.'s green chemistry activities?
- What impediments exist that deter companies from pursuing green chemistry solutions? What more can the Federal government do to encourage adoption of green chemistry products and processes?
- What are your views on *H.R.*____, the *Green Chemistry Research and Development Act of 2004*? How could the bill be improved?

Questions for Mr. Bradfield

- Please describe Shaw Industries, Inc.'s green chemistry activities. Have past investments in green chemistry paid off for Shaw Industries, Inc.? What environmental and human health benefits have resulted from Shaw Industries, Inc.'s green chemistry activities?
- What impediments exist that deter companies from pursuing green chemistry solutions? What more can the Federal government do to encourage adoption of green chemistry products and processes?

- What are your views on *H.R.____*, the *Green Chemistry Research and Development Act of 2004*? How could the bill be improved?

Questions for Dr. Woodhouse

- What is the potential of green chemistry products and processes to contribute to environmental protection and sustainability?
- What are some of the reasons that chemists have for so long relied on "brown chemistry"? What are the barriers to more rapid development and adoption of green chemistry alternatives?
- What should the Federal government do to accelerate development and adoption of green chemistry products and processes?
- What are your views on *H.R.____*, the *Green Chemistry Research and Development Act of 2004*? How could the bill be improved?

Appendix I

Twelve Principles of Green Chemistry[2]

1. It is better to prevent waste than to treat or clean up waste after it is formed.

2. Synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product.

3. Wherever practicable, synthetic methodologies should be designed to use and generate substances that possess little or no toxicity to human health and the environment.

4. Chemical products should be designed to preserve efficacy of function while reducing toxicity.

5. The use of auxiliary substances (e.g. solvents, separation agents, etc.) should be made unnecessary wherever possible and innocuous when used.

6. Energy requirements should be recognized for their environmental and economic impacts and should be minimized. Synthetic methods should be conducted at ambient temperature and pressure.

7. A raw material of feedstock should be renewable rather than depleting wherever technically and economically practicable.

8. Unnecessary derivatization (blocking group, protection/deprotection, temporary modification of physical/chemical processes) should be avoided whenever possible.

9. Catalytic reagents (as selective as possible) are superior to stoichiometric reagents.

10. Chemical products should be designed so that at the end of their function they do not persist in the environment and break down into innocuous degradation products.

11. Analytical methodologies need to be further developed to allow for real-time, in-process monitoring and control prior to the formation of hazardous substances.

12. Substances and the form of a substance used in a chemical process should be chosen so as to minimize the potential for chemical accidents, including releases, explosions, and fires.

[2] Anastas, P.T., Warner, J.C. *Green Chemistry: Theory and Practice*; Oxford University Press; New York, 1998, pg. 30.

Appendix II

Presidential Green Chemistry Challenge Award Winners

In 1995, the EPA initiated the Presidential Green Chemistry Challenge Award program to recognize achievement in green chemistry. Each year since 1996, awards have been given out in five categories: academic, small business, alternative synthetic pathways, alternative solvents/reaction conditions, and designing safer chemicals. Past winners have included:

- Pfizer, Inc. developed a green chemistry approach to the manufacture of setraline, the active ingredient in the anti-depressant Zoloft®. The new, streamlined process is accomplished in a single step instead of three, reduces consumption of some raw materials by as much as 60 percent, and uses a single, benign solvent instead of four. As a result, Pfizer, Inc. has improved worker and environmental safety, reduced energy and water use, and doubled overall product yield. (*Alternative Synthetic Pathways Award, 2002*)

- Shaw Industries, Inc. developed a novel type of carpet tile backing made from their EcoWorx™ compound. Traditional carpet tile backings are landfilled at the end of their useful life. Also, the combustion of PVC backings, the most commonly used carpet tile backings, produces toxic byproducts. EcoWorx™, on the other hand, is made from low toxicity feedstocks and is recyclable. The cost of collection, transportation, and recycling of EcoWorx™ carpet tile backings is less than the cost of using virgin raw materials. (*Designing Safer Chemicals, 2003*)

- SC Fluids, Inc. developed a new technology to improve manufacturing processes in the semiconductor industry. The fabrication of integrated circuits currently generates an estimated 4 million gallons of wastewater and uses thousands of gallons of corrosive chemicals and hazardous solvents per day. Supercritical CO_2 Resist Remover (SCORR) technology offers a cost-effective alternative by using supercritical CO_2 to strip resist from the silicon wafer. SCORR outperforms conventional resist removal techniques in the areas of waste minimization, water use, energy consumption, worker safety, feature size compatibility, material compatibility, and cost. (*Small Business Award, 2002)*

- Cargill Dow LLC developed a new family of polymers derived entirely from annually renewable resources that is competitive on a cost and performance basis with traditional plastics. Called NatureWorks™, it requires 20-50 percent less fossil resources than comparable petroleum-based plastics, and is fully biodegradable or recyclable. (*Alternative Solvents/Reaction Conditions Award, 2002)*

- Chemical Specialties, Inc developed an alternative wood preserving product called ACQ. More than 95% of pressure-treated wood is currently preserved with a chemical known as CCA. To manufacture CCA, approximately 40 million pounds of arsenic and 64 million pounds of hexavalent chromium (both probable carcinogens) are used. These chemicals may pose a risk to children through contact with CCA-treated items such as playground equipment. ACQ, however, does not contain arsenic or hexavalent chromium. Widespread adoption of ACQ has the potential to nearly eliminate the use of arsenic in the U.S., and would eliminate 64 million pounds of hexavelant chromium. This would also avoid the risks associated with the production, transportation, use and disposal of these chemicals. (*Designing Safer Chemicals Award, 2002)*

- Biofine, Inc. developed a novel technique to convert biomass waste into levulinic acid and its derivatives. Biofine, Inc., in collaboration with the Department of Energy, the New York State Energy Research and Development Authority, and Biometics, Inc., developed a method to convert biomass waste, including municipal solid waste, unrecyclable municipal waste paper, waste wood, and agricultural residues, into levulinic acid and its derivatives, which are marketable chemicals in many sectors. One full-scale commercial plant could convert 1000 dry tons of waste per day into 160 million pounds per year of product. (*Small Business Award, 1999)*

- Professor Joseph M. DeSimone from the University of North Carolina at Chapel Hill and North Carolina State University initiated a research program aimed at dramatically advancing the solubility performance characteristics of carbon dioxide (CO_2). More than 30 billion pounds of organic and halogenated solvents are used each year that have a variety of negative impacts on the workplace and the environment. CO_2 has long been recognized as an ideal solvent, since it is nontoxic, nonflammable, safe to work with, energy efficient, cost-effective, waste minimizing, and reusable. This work has applications in the precision cleaning, medical device fabrication, garment care, and chemical manufacturing and coating industries. (*Academic Award, 1997)*

- BHC Company developed a new process for the manufacture of ibuprofen in which virtually all starting materials are either converted to product or are recovered and recycled. Using this process, the generation of waste is all but eliminated. This process has been hailed as a model of source reduction. (*Alternative Synthetic Pathways Award, 1997)*

Appendix III

Section-by-Section Analysis of H.R. ____,
The Green Chemistry Research and Development Act of 2004

Sec. 1. Short Title

"Green Chemistry Research and Development Act of 2004"

Sec. 2. Definitions

Defines terms used in the text.

Sec. 3. Green Chemistry Research and Development Program

Establishes an interagency research and development (R&D) program to promote and coordinate Federal green chemistry research, development, demonstration, education, and technology transfer activities. The program will provide sustained support for green chemistry R&D through merit-reviewed competitive grants to researchers, teams of researchers, and university-industry R&D partnerships, and through R&D conducted at Federal laboratories.

The program will provide support for, and encouragement of, the application of green chemistry through encouragement of consideration of green chemistry in all Federally-funded chemical science and engineering R&D; examination of methods to create incentives for the use of green chemistry; promotion of the education and training of undergraduate and graduate students in green chemistry; collection and dissemination of information on green chemistry R&D and technology transfer; and provision of venues for outreach and dissemination of green chemistry advances such as symposia, forums, conferences, and written materials.

Establishes an interagency working group composed of representatives from the National Science Foundation, the National Institute for Standards and Technology, the Department of Energy, the Environmental Protection Agency, and any other agency that the President may designate, to oversee the planning, management, and coordination of all Federal green chemistry R&D activities. Names the Director of the National Science Foundation and the Assistant Administrator for R&D at the Environmental Protection Agency as co-chairs and requires the group to establish goals and priorities for the program and provide for interagency coordination, including budget coordination. Requires the group to submit a report to the Committee on Science of the House of Representatives and the Committee on Commerce, Science and Transportation of the Senate within two years that includes a summary of Federally-funded green chemistry activities and an analysis of the progress made towards the goals and priorities established for the program, including recommendations for future program activities.

Sec. 4. Authorization of Appropriations

Authorizes appropriations for green chemistry R&D programs, from sums already authorized to be appropriated, at the National Science Foundation, the National Institute of Standards and Technology, the Department of Energy, and the Environmental Protection Agency.

Agency	FY05 (millions $)	FY06 (millions $)	FY07 (millions $)
NSF	7	7.5	8
NIST	5	5.5	6
DOE	7	7.5	8
EPA	7	7.5	8
Total	**26**	**28**	**30**

From sums already authorized to be appropriated for each of the agencies.